

DRINKING WATER SURVEILLANCE PROGRAM

**HARROW-COLCHESTER
WATER SUPPLY
SYSTEM**

REPORT FOR 1991 AND 1992

HARROW-COLCHESTER WATER SUPPLY SYSTEM
DRINKING WATER SURVEILLANCE PROGRAM
REPORT FOR 1991 AND 1992

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

HARROW-COLCHESTER WATER SUPPLY SYSTEM 1991 AND 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The Harrow-Colchester water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, taste and odour control and disinfection. Chlorine is added at the mouth of the intake structure for zebra mussel control when the raw water temperature is above 12°C. This plant has a design capacity of 10.2 x 1000 m³/day. The Harrow-Colchester water supply system serves a population of approximately 5,900.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Harrow-Colchester water supply system, for the sample years 1991 and 1992, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A ' ' ' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE		RAW INTAKE		TREATED		WALNUT ST.		RR#1 HARROW	
	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE
BACTERIOLOGICAL	30	14	46	10	1	10	9	1	11	5
CHEMISTRY (FIELD)	30	30	100	60	60	100	108	108	100	54
CHEMISTRY (LABORATORY)	236	207	87	236	171	72	371	316	85	210
METALS	217	96	44	240	65	27	414	145	35	230
CHLOROAROMATICS	91	0	0	91	0	0	70	0	0	14
CHLOROPHENOLS	6	0	0	6	0	0	0	0	0	0
PESTICIDES AND PCB	247	0	0	247	0	0	110	0	0	22
PHENOLICS	10	3	30	10	0	0	0	0	0	0
POLYAROMATIC HYDROCARBONS	68	0	0	51	0	0	51	0	0	34
SPECIFIC PESTICIDES	27	0	0	27	0	0	1	0	0	1
VOLATILES	296	0	0	296	40	13	265	36	13	145
RADIONUCLIDES	14	5	35	14	2	14	0	0	0	0
TOTAL	1,272	355	1,288	339	1,399	606	715	326	715	326

DRINKING WATER SURVEILLANCE PROGRAM
HARROW-COLCHESTER WATER SUPPLY SYSTEM
1991 AND 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Harrow-Colchester water supply system the spring of 1985 as part of a pesticide study conducted in the southwestern region. Previous DWSP annual reports have been published for 1986, 1987, 1988, 1989 and 1990.

PLANT DESCRIPTION

The Harrow-Colchester water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, taste and odour control and disinfection. Chlorine is added at the mouth of the intake structure for zebra mussel control when the raw water temperature is above 12°C. This plant has a design capacity of $10.2 \times 1000 \text{ m}^3/\text{day}$. The Harrow-Colchester water supply system serves a population of approximately 5,900.

The sample day flows ranged from $1.5 \times 1000 \text{ m}^3/\text{day}$ to $4.84 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

To obtain a representative raw water sample, free from any added chemicals, at plants which used chlorine for zebra mussel control, the operator was required to turn off the chlorine feed to the mouth of the intake and allow enough time for the chlorinated water to clear from the intake works.

Plant operating personnel routinely analyzed parameters for process control (Table 2).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between the raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). These objectives are applied to the free flowing water. When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

The guidelines are evaluated on the results from the free flowing samples. Standing samples in the distribution system can show elevated concentrations in certain metals if the water is corrosive or if the standing time is excessive. Flushing the tap until the water achieves the coolest temperature will ensure that the water used for consumption will contain minimum concentrations of metals.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- THE TREATED AND DISTRIBUTED WATER;**
- ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE
GUIDELINE VALUES; AND**
- POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis

conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Aesthetic Objective of 15°C in 10 of 24 treated and distributed water samples with a maximum reported value of 25.7°C.

CHEMISTRY (LABORATORY)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L in all 24 treated and distributed water samples with a maximum reported value of 138.5 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to measure the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant to avoid problems in the distribution system.

Aluminum exceeded the ODWO Recommended Operational Guideline of 100 ug/L in 2 of 24 treated and distributed water samples with a maximum reported value of 120.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

PESTICIDES AND PCB

The results of the pesticide and pcb scan showed that none were detected above trace levels.

PHENOLICS

The results of the phenolics test showed that none were detected above trace levels.

POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

SPECIFIC PESTICIDES

The results of the specific pesticide scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in all 24 treated and distributed water samples analyzed. The maximum observed level was 31.0 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

No known health related guidelines were exceeded.

The Harrow-Colchester water supply system, for the sample years 1991 and 1992, produced good quality water and this was maintained in the distribution system.

FIGURE 1

HARROW-DOLOCHESTER SOUTH WATER TREATMENT PLANT

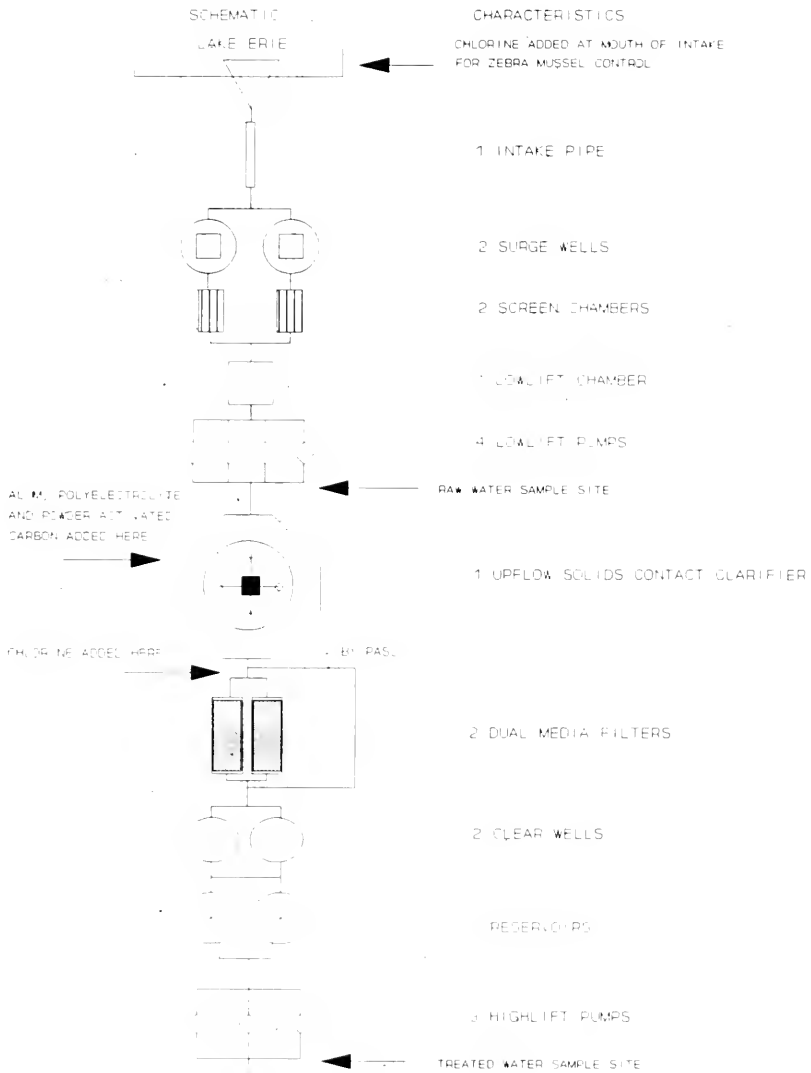


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

PLANT NAME: HARROW-COLCHESTER SOUTH WSS
WORKS #: 210000130
UTM #: 173567004654000

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER: J. DRUMMOND

SUPERINTENDENT: DON MARONTATE

ADDRESS: P.O. BOX 909
HARROW, ONTARIO
N0R 1G0
519-738-3038

MUNICIPALITY: HARROW-COLCHESTER
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	3.099	(X 1000 M3)
DESIGN CAPACITY:	10.229	(X 1000 M3/DAY)
RATED CAPACITY:	-	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
COLCHESTER SOUTH TWP	3,138
HARROW	2,780

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
FREE CHLORINE RESIDUAL	TREATED	DAILY READING
TOTAL CHLORINE RESIDUAL	TREATED	DAILY READING
PH	RAW	DAILY READING
	TREATED	DAILY READING
TEMPERATURE	RAW	DAILY READING
TURBIDITY	RAW	DAILY READING
	TREATED	DAILY READING

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS SAMPLE DAY CONDITIONS
AND TREATMENT CHEMICAL DOSAGES FOR 1991 AND 1992

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	COAGULATION ALUM LIQUID	COAGULATION AID POLYELECTROLYTE	TASTE & ODOUR ACTIVATED CARBON POWDER	POST CHLORINATION CHLORINE
91 JAN 29 24.00	1.550	20.00		.10	5.00	1.45
91 MAR 26 26.40	1.773	20.00		.10	5.00	.49
91 MAY 27 24.00	2.064	20.00		.10	5.00	.54
91 JUL 23 5.40	5.528	20.00		.10	5.00	.85
91 SEP 24 23.45	2.300	20.00		.16	8.00	1.77
91 NOV 26 26.50	1.782	20.00		.15	8.00	1.28
92 JAN 28 25.30	1.787	25.00		.15	5.00	1.27
92 APR 28 24.20	2.041	20.00		.10	5.00	.57
92 JUL 28 24.00	2.291	20.00		.15	5.00	.20
92 OCT 26 24.00	4.840	20.00		.15	5.00	.60

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

- A. ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
 - 1+. MAC for Total Trihalomethanes
 2. Interim Maximum Acceptable Concentration (IMAC)
 3. Aesthetic Objective (AO)
 - 3*. AO for Total Xylenes
 4. Recommended Operational Guideline
 5. Health Related Guidance Value
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
 2. Proposed MAC
 3. Interim MAC
 4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
 2. Tentative GV
 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
 2. Suggested No-Adverse Effect Level (SNAEL)
 3. Lifetime Health Advisory
 4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
 2. Aesthetic Guideline Level
 3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!48	No Data: Sample Age Exceeded 48 Hours
!AR	No Data: No Numeric Results
!AW	No Data: Analysis Withdrawn
!BT	No Data: Sample Broken In Transit
!CS	No Data: Contamination Suspected
!EF	No Data: Laboratory Equipment Failure
!IR	No Data: Insufficient Sample
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedure Error: Sample Discarded
!PR	No Data: Preservative Required
!QU	No Data: Quality Control Unacceptable
!RE	No Data: Received Empty
!RO	No Data: No Numeric Results
!SM	No Data: Sample Missing
!SS	No Data: Sample Improperly Preserved
!U	No Data: Sample Unsuitable For Analysis
!UB	No Data: Bottle Broken
!UN	No Data: Result Unreliable

!UR	No Data: Unpreserved Sample Required
A	Approximate Value
A3C	Approximate, Total Count Exceeded 300 Colonies
A>	Approximate Value, Exceeded Normal Range
APS	Additional Peak, Less Than, Not Priority Pollutant
ARO	Additional Information In Laboratory Report
CRO	Calculated Result Only
NAF	Not All Required Tests Found
RID	Ioncal Calculated on Incomplete Data Set
RMP	P and M-Xylene Not Separated
RRR	Result Obtained by Repeat Analysis
RRV	Rerun Verification
SFA	Sample Filtered: Filtrate Analyzed
SIL	Sample Incorrectly Labelled
SPS	Several Peaks, Small, Not Priority Pollutant
U48	Unreliable: Sample Age Exceeded 48 Hours
UAL	Unreliable: Sample Age Exceeded Limit
UAU	Unreliable: Sample Age Unknown
UCS	Unreliable: Contamination Suspected
WSD	Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
BACTERIOLOGICAL					
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)	
1991 JAN	4	-	-	-	-
1991 MAR	40	-	-	-	-
1991 MAY	BDL	-	-	-	-
1991 JUL	BDL	-	-	-	-
1991 SEP	BDL	-	-	-	-
1991 NOV	392	-	-	-	-
1992 JAN	BDL	-	-	-	-
1992 APR	BDL	-	-	-	-
1992 JUL	0	-	-	-	-
1992 OCT	10	-	-	-	-
STANDARD PLATE CNT MF (CT/ML)					
		DET'N LIMIT = 0		GUIDELINE = 500 (A3)	
1991 JAN	-	0 <=>	-	28	-
1991 MAR	-	5 <=>	-	4 <=>	-
1991 MAY	-	13	62	18	-
1991 JUL	-	1 <=>	1 <=>	1 <=>	-
1991 SEP	-	1 <=>	0 <=>	27	-
1991 NOV	-	0 <=>	2 <=>	-	-
1992 JAN	-	1 <=>	0 <=>	-	-
1992 APR	-	1 <=>	0 <=>	-	-
1992 JUL	-	2 <=>	4 <=>	-	-
1992 OCT	-	0 <=>	-	-	-
TOTAL COLIFORM MF (CT/100ML)					
		DET'N LIMIT = 0		GUIDELINE = 5/100ML (A1)	
1991 JAN	40 <=>	-	-	-	-
1991 MAR	1800	-	-	-	-
1991 MAY	BDL	-	-	-	-
1991 JUL	BDL	-	-	-	-
1991 SEP	BDL	-	-	-	-
1991 NOV	6600 A3C	-	-	-	-
1992 JAN	10 <=>	-	-	-	-
1992 APR	BDL	-	-	-	-
1992 JUL	10 <=>	-	-	-	-
1992 OCT	170 A3C	-	-	-	-

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TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
BACTERIOLOGICAL					
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A	
1991 JAN	200				
1991 MAR	23000				
1991 MAY	160 <=>				
1991 JUL	80 <=>				
1991 SEP	24000 >				
1991 NOV	57000 A3C				
1992 JAN	180				
1992 APR	BOL				
1992 JUL	24000 >				
1992 OCT	24000 >				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (FIELD)					
FLO CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A		
1991 JAN	.190	.090	.120	.170	.100
1991 MAR	.110	.120	.050	.140	.140
1991 MAY	.120	.090	.070	.080	.080
1991 JUL	.140	.090	.220	.050	.080
1991 SEP	.770	.150	.150	.140	.100
1991 NOV	.090	.050	.050	.	.
1992 JAN	.130	.130	.110	.	.
1992 APR	.090	.090	.100	.	.
1992 JUL	.160	.110	.220	.	.
1992 OCT	.110	.	.	.	.
FLO CHLORINE FREE (MG/L)					
		DET'N LIMIT = 0	GUIDELINE = N/A		
1991 JAN	.500	.430	.350	.480	.390
1991 MAR	.380	.370	.250	.310	.210
1991 MAY	.420	.320	.210	.360	.210
1991 JUL	.710	.530	.010	.680	.590
1991 SEP	.680	.330	.100	.540	.490
1991 NOV	.340	.380	.170	.	.
1992 JAN	.620	.590	.210	.	.
1992 APR	.480	.410	.280	.	.
1992 JUL	.600	.380	.020	.	.
1992 OCT	.400	.	.	.	.
FLO CHLORINE (TOTAL) (MG/L)					
		DET'N LIMIT = 0	GUIDELINE = N/A		
1991 JAN	.690	.520	.470	.650	.490
1991 MAR	.490	.490	.300	.450	.350
1991 MAY	.540	.410	.300	.430	.290
1991 JUL	.850	.620	.230	.730	.670
1991 SEP	1.450	.480	.250	.680	.590
1991 NOV	.630	.430	.220	.	.
1992 JAN	.750	.720	.320	.	.
1992 APR	.570	.500	.380	.	.
1992 JUL	.760	.490	.240	.	.
1992 OCT	.510	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT-PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (FIELD)					
FLO PH (OMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)	
1991 JAN	7.800	7.070	7.320	7.600	7.500
1991 MAR	7.970	7.340	7.330	7.500	7.500
1991 MAY	7.500	6.990	7.210	7.400	7.540
1991 JUL	7.600	6.900	7.000	7.400	7.420
1991 SEP	8.100	7.100	5.950	7.670	7.830
1991 NOV	7.950	7.200	6.860	.	.
1992 JAN	7.700	6.800	6.840	.	.
1992 APR	8.100	7.270	6.730	.	.
1992 JUL	7.850	7.170	7.310	.	.
1992 OCT	8.190	7.030	7.540	.	.
FLO TEMPERATURE (DEG.C)					
		DET'N LIMIT = N/A		GUIDELINE = 15 (A3)	
1991 JAN	1.700	2.900	10.000	8.000	12.700
1991 MAR	5.500	7.200	8.000	8.000	11.900
1991 MAY	17.700	19.600	15.500	14.500	19.500
1991 JUL	25.600	25.700	21.000	21.000	19.300
1991 SEP	19.800	20.200	20.000	17.800	18.900
1991 NOV	5.100	6.800	14.500	.	.
1992 JAN	2.300	2.700	11.000	.	.
1992 APR	9.300	9.100	10.000	.	.
1992 JUL	23.000	22.500	10.000	.	.
1992 OCT	11.100	11.000	18.000	.	.
FLO TURBIDITY (FTU)					
		DET'N LIMIT = N/A		GUIDELINE = 1.0 (A1)	
1991 JAN	1.400	.080	.130	.	.
1991 MAR	100.000	.130	.170	.	.
1991 MAY	1.300	.090	.160	.150	.160
1991 JUL	1.700	.090	.240	.110	.140
1991 SEP	2.300	.080	.200	.	.
1991 NOV	78.000	.120	.220	.	.
1992 JAN	2.800	.090	.150	.	.
1992 APR	2.000	.070	.130	.	.
1992 JUL	2.400	.110	.170	.	.
1992 OCT	15.000	.090	.	.	.

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DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (LABORATORY)					
ALKALINITY (MG/L)		DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
1991 JAN	92,000	83,900	85,200	89,300	90,300
1991 MAR	111,000	88,900	88,600	89,800	89,600
1991 MAY	90,600	81,200	81,300	87,900	87,700
1991 JUL	86,400	77,200	77,700	82,600	82,500
1991 SEP	87,100	80,300	79,800	82,400	82,100
1991 NOV	87,600	81,100	79,500	-	-
1992 JAN	88,300	77,700	77,200	-	-
1992 APR	87,500	79,900	80,700	-	-
1992 JUL	85,100	78,200	77,800	-	-
1992 OCT	91,900	82,200	-	-	-
CALCIUM (MG/L)		DET'N LIMIT = 0.20	GUIDELINE = 100 (F2)		
1991 JAN	32,100	34,800	35,700	39,500	39,400
1991 MAR	41,900	35,200	36,300	37,400	36,700
1991 MAY	32,800	32,400	33,400	36,900	37,000
1991 JUL	31,400	32,200	32,800	35,400	35,400
1991 SEP	30,100	32,300	31,500	34,300	34,900
1991 NOV	34,200	34,200	32,400	-	-
1992 JAN	32,200	32,800	33,200	-	-
1992 APR	31,150	33,650	33,800	-	-
1992 JUL	29,500	31,300	31,200	-	-
1992 OCT	31,700	32,250	-	-	-
CYANIDE (MG/L)		DET'N LIMIT = 0.001	GUIDELINE = 0.2 (A1)		
16 SAMPLES	BDL	BDL	-	-	-
CHLORIDE (MG/L)		DET'N LIMIT = 0.20	GUIDELINE = 250 (A3)		
1991 JAN	13,800	15,400	16,300	15,600	15,800
1991 MAR	32,400	18,400	18,700	16,200	16,400
1991 MAY	13,300	15,300	15,700	16,600	16,700
1991 JUL	13,700	14,700	15,200	15,200	15,000
1991 SEP	15,500	16,900	16,200	14,300	14,400
1991 NOV	28,200	22,600	15,600	-	-
1992 JAN	15,800	17,000	18,400	-	-
1992 APR	13,700	14,900	15,400	-	-
1992 JUL	9,900	11,500	12,000	-	-
1992 OCT	12,100	13,200	-	-	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE		TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (LABORATORY)						
COLOUR (HZU)		DET'N LIMIT = 0.50		GUIDELINE = 5 (A3)		
1991 JAN	2.000 <T	BDL	.500 <T	BDL	.500 <T	.500 <T
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	1.500 <T	.500 <T	.500 <T	1.000 <T	.500 <T	.500 <T
1991 JUL	1.000 <T	.500 <T	.500 <T	.500 <T	BDL	.500 <T
1991 SEP	.500 <T	1.000 <T	1.000 <T	1.000 <T	1.000 <T	1.000
1991 NOV	9.000	1.000 <T	.500 <T	.500 <T	.	.
1992 JAN	BDL	.500 <T	.500 <T	.500 <T	.	.
1992 APR	2.000	BDL	BDL	.500 <T	.	.
1992 JUL	1.000 <T	.500 <T	BDL	.500 <T	.	.
1992 OCT	BDL	.500 <T	.	.	.	.
CONDUCTIVITY (UMHO/CM)						
		DET'N LIMIT = 1.0		GUIDELINE = 400 (F2)		
1991 JAN	259	268	273	280	282	285
1991 MAR	351	340	298	300	286	286
1991 MAY	249	260	259	261	273	274
1991 JUL	242	250	251	253	261	259
1991 SEP	250	262	263	264	260	260
1991 NOV	294	291	269	262	.	.
1992 JAN	267	274	277	283	.	.
1992 APR	252	260	266	269	.	.
1992 JUL	237	255	251	253	.	.
1992 OCT	247	255	.	.	.	.
DISS ORG CARBON (MG/L)						
		DET'N LIMIT = 0.10		GUIDELINE = 5.0 (A3)		
1991 JAN	1.700	1.000	1.400	1.400	1.200	1.400
1991 MAR	2.200	1.600	1.300	3.100	1.100	1.200
1991 MAY	1.700	1.100	1.200	1.400	1.100	1.200
1991 JUL	1.700	1.000	1.100	2.100	1.100	1.000
1991 SEP	1.700	1.000	1.100	3.000	1.100	1.200
1991 NOV	1.600	1.100	1.100	1.600	.	.
1992 JAN	1.700	1.000	.900	1.800	.	.
1992 APR	1.600	.900	1.000	1.100	.	.
1992 JUL	1.600	1.000	.900	1.900	.	.
1992 OCT	1.900	1.300	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	TREATMENT PLANT	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (LABORATORY)						
FLUORIDE (MG/L)			DET'N LIMIT = 0.01		GUIDELINE = 1.5 (A1)	
1991 JAN	.100	.080	.080	.080	.080	.080
1991 MAR	.120	.120	.100	.100	.100	.100
1991 MAY	.080	.080	.080	.080	.060	.080
1991 JUL	.080	.080	.080	.080	.080	.080
1991 SEP	.060	.040 <T	.020 <T	.040 <T	.040 <T	.040 <T
1991 NOV	.100	.080	.080	.080	.	.
1992 JAN	.100	.080	.080	.060	.	.
1992 APR	.100	.080	.080	.100	.	.
1992 JUL	.100	.100	.100	.	.	.
1992 OCT	.100	.080	.	.	.	.
HARDNESS (MG/L)			DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)	
1991 JAN	113.600	118.200	119.800	123.000	129.400	128.500
1991 MAR	144.400	138.500	123.400	126.500	122.500	122.200
1991 MAY	114.500	114.900	112.800	115.900	122.500	122.400
1991 JUL	112.000	113.000	113.000	114.000	118.000	118.000
1991 SEP	107.900	113.400	111.900	110.300	111.600	113.000
1991 NOV	118.700	120.300	118.900	113.500	.	.
1992 JAN	112.100	112.600	112.800	114.400	.	.
1992 APR	109.800	111.500	112.300	116.400	.	.
1992 JUL	106.000	107.000	109.000	109.000	.	.
1992 OCT	112.550	113.500	.	.	.	.
IONCAL (CMMSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A	
1991 JAN	.852	.973	.486	.344	2.731	1.509
1991 MAR	2.661	3.025	3.853	.931	2.751	2.878
1991 MAY	.813 NAF	.688 NAF	2.275 NAF	.192 NAF	.474 NAF	.075 NAF
1991 JUL	.269	.192	.235	.547	.424	.006
1991 SEP	2.868 NAF	.020 NAF	1.908 NAF	2.103 NAF	3.191 NAF	1.958 NAF
1991 NOV	.301	.923	1.169	.132	.	.
1992 JAN	2.406	2.690	4.657	3.145	.	.
1992 APR	2.636	3.504	.854	2.593	.	.
1992 JUL	2.065	1.436 NAF	.768 NAF	1.631 NAF	.	.
1992 OCT	.720	1.095	.	.	.	.

TABLE 4
- DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (LABORATORY)					
POTASSIUM (MG/L)		DET'N LIMIT = 0.01	GUIDELINE = 10 (F2)		
1991 JAN	1.120	1.100	1.110	1.200	1.250
1991 MAR	2.440	1.350	1.310	1.930	1.210
1991 MAY	1.130	1.110	1.150	1.140	1.140
1991 JUL	1.050	1.000	1.050	1.150	1.100
1991 SEP	1.050	1.040	1.080	1.690	1.060
1991 NOV	1.180	1.080	1.110	1.150	-
1992 JAN	1.130	1.070	1.220	1.220	-
1992 APR	1.159	1.125	1.159	1.159	-
1992 JUL	1.120	1.010	1.000	1.180	-
1992 OCT	1.339	1.123	-	-	-
LANGELIERS INDEX (OMNLESS)					
		DET'N LIMIT = N/A	GUIDELINE = N/A		
1991 JAN	.257	.023	.177	.132	.268
1991 MAR	.391	.160	.067	.098	.173
1991 MAY	.284	.135	.070	.030	.142
1991 JUL	.317	.059	.122	.075	.272
1991 SEP	.319	.173	.228	.135	.328
1991 NOV	.250	.122	.126	.027	-
1992 JAN	.248	.031	.006	.036	-
1992 APR	.225	.081	.026	.019	-
1992 JUL	.235 NAF	.194 NAF	.091 NAF	.096 NAF	-
1992 OCT	.256	.082	-	-	-
MAGNESIUM (MG/L)					
		DET'N LIMIT = 0.1	GUIDELINE = 30.0 (F2)		
1991 JAN	8.150	8.200	8.000	8.250	7.350
1991 MAR	9.650	9.000	8.650	8.750	7.450
1991 MAY	7.950	7.900	7.750	7.900	7.300
1991 JUL	8.000	8.100	8.000	7.800	7.200
1991 SEP	7.950	8.000	7.650	7.750	6.300
1991 NOV	8.100	8.200	8.100	7.900	-
1992 JAN	7.700	7.700	7.500	7.650	-
1992 APR	7.750	7.910	7.830	7.790	-
1992 JUL	7.950	7.870	7.620	7.590	-
1992 OCT	8.120	8.010	-	-	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (LABORATORY)					
SODIUM (MG/L)		DET'N LIMIT = 0.20		GUIDELINE = 200 (A4)	
1991 JAN	7.500	7.600	7.600	7.800	8.000
1991 MAR	15.100	12.200	8.700	9.200	7.900
1991 MAY	7.200	7.500	7.800	8.000	8.100
1991 JUL	5.600	5.600	5.800	6.000	6.000
1991 SEP	7.400	7.700	7.400	7.400	6.700
1991 NOV	11.400	9.600	7.500	7.200	
1992 JAN	7.200	7.300	7.800		
1992 APR	7.230	7.200	7.450		
1992 JUL	5.840	8.050	6.250		
1992 OCT	6.550	6.620			
AMMONIUM TOTAL (MG/L)					
		DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)	
1991 JAN	.030	BDL	.042	BDL	BDL
1991 MAR	.016 SFA	BDL	.004 <T	BDL	BDL
1991 MAY	BDL	BDL	.024	BDL	BDL
1991 JUL	.010	BDL	.098	BDL	BDL
1991 SEP	.006 <T	BDL	.068	BDL	BDL
1991 NOV	.020	BDL	.058		
1992 JAN	.024	BDL	.088		
1992 APR	.008 <T	BDL	.010		
1992 JUL	BDL	BDL	.088		
1992 OCT	.014	.002 <T			
NITRITE (MG/L)					
		DET'N LIMIT = 0.001		GUIDELINE = 1.0 (A1)	
1991 JAN	.004 <T	BDL	.001 <T	BDL	BDL
1991 MAR	.019 SFA	BDL	BDL	BDL	BDL
1991 MAY	.004 <T	BDL	.001 <T	BDL	.001 <T
1991 JUL	.003 <T	BDL	.001 <T	BDL	BDL
1991 SEP	.003 <T	BDL	BDL	BDL	BDL
1991 NOV	.013	BDL	.001 <T		
1992 JAN	.005	BDL	.002 <T		
1992 APR	.005	.002 <T	.002 <T		
1992 JUL	.005	BDL	.001 <T		
1992 OCT	.009	BDL			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 NARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (LABORATORY)					
NITRATE (TOTAL) (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10.0 (A1)	
1991 JAN	.545	.565	.615	.655	.660
1991 MAR	1,240 SFA	1.050	.775	.625	.630
1991 MAY	.490	.500	.495	.515	.505
1991 JUL	.310	.285	.290	.280	.285
1991 SEP	.210	.185	.215	.195	.200
1991 NOV	.440	.435	.405	.	.
1992 JAN	.500	.500	.545	.	.
1992 APR	.755	.750	.830	.	.
1992 JUL	.355	.350	.390	.	.
1992 OCT	.450	.445	.	.	.
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A	
1991 JAN	.200	.120	.290	.110	.100
1991 MAR	.650	.160	.110	.100	.130
1991 MAY	.220	.130	.200	.130	.120
1991 JUL	.170	.090 <T	.510	.060 <T	.080 <T
1991 SEP	.260	.090 <T	.330	.070 <T	.080 <T
1991 NOV	.560	.100	.110	.	.
1992 JAN	.200	.110	.420	.	.
1992 APR	.210	.100	.170	.	.
1992 JUL	.190	.080 <T	.450	.	.
1992 OCT	.340	.110	.	.	.
PH (CONMLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)	
1991 JAN	8.210	8.010	8.080	8.190	8.150
1991 MAR	8.170	8.010	8.030	8.110	8.090
1991 MAY	8.230	7.860	7.960	7.980	8.060
1991 JUL	8.300	7.970	7.940	8.070	8.230
1991 SEP	8.320	8.190	8.160	8.300	8.280
1991 NOV	8.210	8.100	8.040	.	.
1992 JAN	8.220	8.070	8.060	.	.
1992 APR	8.210	7.950	8.010	.	.
1992 JUL	8.250	7.970	7.970	.	.
1992 OCT	8.210	8.080	7.940	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARRON-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RR#1 HARRON FREE FLOW	DIST. SYSTEM RR#1 HARRON STANDING
CHEMISTRY (LABORATORY)					
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A	
1991 JAN	.001 <T	.000 <T	.	.	.
1991 MAR	.010 SFA	BDL	.	.	.
1991 MAY	.002 <T	BDL	.	.	.
1991 JUL	.007	BDL	.	.	.
1991 SEP	.006	.001 <T	.	.	.
1991 NOV	.020	.000 <T	.	.	.
1992 JAN	.002	.000 <T	.	.	.
1992 APR	.001 <T	BDL	.	.	.
1992 JUL	.002 <T	BDL	.	.	.
1992 OCT	.008	BDL	.	.	.
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = 0.40 (F2)	
1991 JAN	.009 <T	BDL	.	.	.
1991 MAR	.130	.004 <T	.	.	.
1991 MAY	.010	BDL	.	.	.
1991 JUL	.012	BDL	.	.	.
1991 SEP	.034	BDL	.	.	.
1991 NOV	.122	BDL	.	.	.
1992 JAN	.009 <T	.010	.	.	.
1992 APR	.007 <T	BDL	.	.	.
1992 JUL	.012	BDL	.	.	.
1992 OCT	.044	BDL	.	.	.
RESIDUE FILTRATE (MG/L)		DET'N LIMIT = N/A		GUIDELINE = 500 (A3)	
1991 JAN	168.000 CRO	174.000 CRO	182.000 CRO	183.000 CRO	185.000 CRO
1991 MAR	228.000 CRO	221.000 CRO	194.000 CRO	186.000 CRO	186.000 CRO
1991 MAY	162.000 CRO	169.000 CRO	168.000 CRO	170.000 CRO	178.000 CRO
1991 JUL	157.000 CRO	163.000 CRO	163.000 CRO	170.000 CRO	168.000 CRO
1991 SEP	163.000 CRO	170.000 CRO	171.000 CRO	172.000 CRO	169.000 CRO
1991 NOV	191.000 CRO	189.000 CRO	175.000 CRO	170.000 CRO	.
1992 JAN	174.000 CRO	178.000 CRO	180.000 CRO	184.000 CRO	.
1992 APR	164.000 CRO	169.000 CRO	173.000 CRO	175.000 CRO	.
1992 JUL	154.000 CRO	166.000 CRO	163.000 CRO	164.000 CRO	.
1992 OCT	161.000 CRO	166.000 CRO	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHEMISTRY (LABORATORY)					
SULPHATE (MG/L)		DET'N LIMIT = 0.20		GUIDELINE = 500 (A3)	
1991 JAN	18.430	28.820	29.180	29.180	29.220
1991 MAR	23.020	31.540	31.410	28.870	28.860
1991 MAY	18.710	27.950	27.340	26.460	27.170
1991 JUL	17.580	26.360	26.810	26.540	27.030
1991 SEP	18.370	26.850	26.900	27.160	27.200
1991 NOV	15.870	26.680	26.850	26.820	-
1992 JAN	19.160	30.550	30.450	-	-
1992 APR	19.850	30.180	30.950	-	-
1992 JUL	16.970	25.390	29.620	-	-
1992 OCT	18.120	27.170	25.360	-	-
TURBIDITY (FTU)		DET'N LIMIT = 0.05		GUIDELINE = 1.0 (A1)	
1991 JAN	2.000 RRV	.430	.530	.300	.220
1991 MAR	136.000	.160	.270	.160	.150
1991 MAY	3.200	.260	.500	.390	.200 <T
1991 JUL	2.200	.350	.460	.350	.190
1991 SEP	13.500	.300	.540	.280	.250
1991 NOV	105.000	.370	.230 <T	-	-
1992 JAN	5.000	.190 <T	.380	-	-
1992 APR	6.000	.330	.530	-	-
1992 JUL	6.800	.300	.370	-	-
1992 OCT	44.000	.210 <T	.620	-	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE												TREATMENT PLANT TREATED												DIST. SYSTEM WALNUT ST. FREE FLOW												DIST. SYSTEM STANDING												DIST. SYSTEM RR#1 HARROW FREE FLOW												DIST. 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TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
METALS					
BORON (UG/L)					
1991 JAN	14,000 <T	21,000	17,000 <T	17,000 <T	19,000 <T
1991 MAR	20,000 <T	21,000	23,000	21,000	21,000
1991 MAY	37,000	13,000 <T	13,000 <T	13,000 <T	13,000 <T
1991 JUL	18,000 <T	17,000 <T	17,000 <T	17,000 <T	17,000 <T
1991 SEP	15,000 <T	19,000 <T	14,000 <T	20,000 <T	14,000 <T
1991 NOV	21,000	17,000 <T	18,000 <T	-	-
1992 JAN	22,000	21,000	21,000	-	-
1992 APR	14,000 <T	20,000 <T	20,000 <T	-	-
1992 JUL	16,000 <T	19,000 <T	20,000 <T	-	-
1992 OCT	16,000 <T	19,000 <T	20,000 <T	-	-
BERYLLIUM (UG/L)					
1991 JAN	BDL	BDL	BDL	BDL	BDL
1991 MAR	.110 <T	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL
1991 JUL	15M	BDL	BDL	BDL	BDL
1991 SEP	BDL	.150 <T	.160 <T	.200 <T	.170 <T
1991 NOV	.080 <T	BDL	BDL	-	-
1992 JAN	BDL	BDL	BDL	-	-
1992 APR	BDL	BDL	BDL	-	-
1992 JUL	BDL	BDL	BDL	-	-
1992 OCT	.060 <T	BDL	-	-	-
CADMIUM (UG/L)					
1991 JAN	BDL	BDL	BDL	BDL	BDL
1991 MAR	.060 <T	BDL	.060 <T	BDL	BDL
1991 MAY	.060 <T	BDL	.200 <T	BDL	BDL
1991 JUL	15M	BDL	.140 <T	BDL	BDL
1991 SEP	BDL	.060 <T	.180 <T	BDL	BDL
1991 NOV	.070 <T	BDL	.160 <T	-	-
1992 JAN	BDL	.060 <T	.280 <T	-	-
1992 APR	.070 <T	.090 <T	.130 <T	-	-
1992 JUL	BDL	BDL	.730	-	-
1992 OCT	BDL	-	-	-	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
METALS					
COBALT (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A	
1991 JAN	.050 <T	.080 <T	.060 <T	.080 <T	.100 <T
1991 MAR	1.200	.050 <T	.070 <T	.040 <T	.040 <T
1991 MAY	.320 <T	BOL	BOL	BOL	BOL
1991 JUL	ISM	.070 <T	.050 <T	.070 <T	.070 <T
1991 SEP	.320 <T	.100 <T	.120 <T	.120 <T	.140 <T
1991 NOV	1.300	.180 <T	.040 <T	.030 <T	.
1992 JAN	.130 <T	.120 <T	.070 <T	.	.
1992 APR	.250 <T	.180 <T	.200 <T	.	.
1992 JUL	.260 <T	.220 <T	.	.	.
1992 OCT	1.300	1.000 <T	.	.	.
CHROMIUM (UG/L)					
		DET'N LIMIT = 0.50		GUIDELINE = 50.0 (A1)	
1991 JAN	1.000 <T	BOL	1.500 <T	1.600 <T	.900 <T
1991 MAR	3.800 <T	1.900 <T	2.200 <T	2.200 <T	2.300 <T
1991 MAY	1.700 <T	.650 <T	.690 <T	.760 <T	.740 <T
1991 JUL	ISM	BOL	.790 <T	BOL	BOL
1991 SEP	.620 <T	BOL	BOL	2.200 <T	.580 <T
1991 NOV	4.200 <T	1.700 <T	.660 <T	.	.
1992 JAN	3.100 <T	.620 <T	.890 <T	.	.
1992 APR	BOL	BOL	BOL	.	.
1992 JUL	.670 <T	.610 <T	.690 <T	.	.
1992 OCT	1.200 <T	BOL	.	.	.
COPPER (UG/L)					
		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)	
1991 JAN	55.000	.690 <T	270.000	4.100 <T	63.000
1991 MAR	48.000	.840 <T	18.000	6.300	39.000
1991 MAY	100.000	1.100 <T	23.000	6.100	70.000
1991 JUL	ISM	.670 <T	21.000	2.300 <T	9.000
1991 SEP	48.000	1.100 <T	2.800 <T	.	.
1991 NOV	52.000	.510 <T	34.000	.	.
1992 JAN	60.000	1.000 <T	21.000	.	.
1992 APR	56.000	.830 <T	21.000	.	.
1992 JUL	180.000	1.300 <T	14.000	.	.
1992 OCT	31.000	.580 <T	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
METALS					
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)	
1991 JAN	38,000 <T	BDL	110,000	BDL	BDL
1991 MAR	1200,000	BDL	BDL	BDL	BDL
1991 MAY	140,000	BDL	BDL	9,800 <T	BDL
1991 JUL	280,000	BDL	BDL	BDL	BDL
1991 SEP	1800,000	BDL	BDL	BDL	BDL
1991 NOV	150,000	23,000 <T	28,000 <T	BDL	BDL
1992 JAN	120,000	BDL	BDL	BDL	BDL
1992 APR	200,000	BDL	BDL	BDL	BDL
1992 JUL	670,000	BDL	14,000 <T	BDL	BDL
1992 OCT		70,000	BDL	BDL	BDL
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1.0 (A1)	
1991 JAN	BDL	BDL	BDL	BDL	BDL
1991 MAR	-030 <T	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL
1991 NOV	.030 <T	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL
1992 APR	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL
1992 OCT	BDL	BDL	BDL	BDL	BDL
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50.0 (A3)	
1991 JAN	1,400	1,800	.940	2,000	.920
1991 MAR	60,000	2,800	1,100	1,100	.720
1991 MAY	5,400	1,400	.440 <T	.370 <T	.350 <T
1991 JUL	1,700	1,700	.250 <T	.410 <T	.210 <T
1991 SEP	14,000	1,700	.350 <T	.380 <T	.230 <T
1991 NOV	83,000	3,800	1,800	1,100	BDL
1992 JAN	3,400	2,500	1,100	.940	BDL
1992 APR	11,000	2,100	.810	1,300	BDL
1992 JUL	22,000	1,500	.670	1,200	BDL
1992 OCT		2,700	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

METALS						
TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	TREATMENT PLANT	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
MOLYBDENUM (UG/L)						
			DET'N LIMIT = 0.05		GUIDELINE = N/A	
1991 JAN	.550	.650	.870	.680	.700	.710
1991 MAR	.120 <T	.900	.830	.880	.740	.710
1991 MAY	.840	.690	.800	.740	.720	.660
1991 JUL	ISM	.700	.620	.700	.630	.640
1991 SEP	.370 <T	.530	.630	.660	.620	.650
1991 NOV	.100 <T	.640	.640	.660	.	.
1992 JAN	.660	.710	.690	.730	.	.
1992 APR	.500 <T	.690	.770	.780	.	.
1992 JUL	.510	.720	.740	.	.	.
1992 OCT	.150 <T	.520	.	.	.	.
NICKEL (UG/L)						
			DET'N LIMIT = 0.20		GUIDELINE = 350 (03)	
1991 JAN	BOL	BOL	.210	3.800 <T	.260 <T	.530 <T
1991 MAR	2.700	.340 <T	.460 <T	2.600	.350 <T	.450 <T
1991 MAY	BOL	BOL	BOL	1.800 <T	BOL	BOL
1991 JUL	ISM	BOL	BOL	2.500	BOL	BOL
1991 SEP	1.400 <T	.470 <T	.440 <T	2.500	.270 <T	.390 <T
1991 NOV	5.300	BOL	BOL	1.700 <T	.	.
1992 JAN	.430 <T	BOL	.250 <T	2.500	.	.
1992 APR	1.600 <T	1.600 <T	1.600 <T	2.900	.	.
1992 JUL	.980 <T	BOL	.360 <T	1.600 <T	.	.
1992 OCT	5.600	4.200	.	.	.	.
LEAD (UG/L)						
			DET'N LIMIT = 0.05		GUIDELINE = 10 (A1)	
1991 JAN	.330 <T	BOL	.060 <T	.860	.210 <T	3.300
1991 MAR	3.100	.090 <T	.110 <T	.560	.260 <T	.650
1991 MAY	.890	.080 <T	.200 <T	.830	.570	1.400
1991 JUL	ISM	BOL	.170 <T	.860	.450 <T	.810
1991 SEP	.980	.080 <T	.110 <T	.690	.380 <T	.720
1991 NOV	3.900	.080 <T	.180 <T	.580	.	.
1992 JAN	.370 <T	BOL	.080 <T	.910	.	.
1992 APR	.440 <T	.070 <T	.080 <T	.830	.	.
1992 JUL	1.300	BOL	.120 <T	1.300	.	.
1992 OCT	1.600	.140 <T	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE		TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW		DIST. SYSTEM WALNUT ST. FREE FLOW		DIST. SYSTEM RR#1 HARROW STANDING	
METALS			DET'N LIMIT = 0.05		GUIDELINE = 146 (04)			
ANTIMONY (UG/L)			DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)			
1991 JAN	.510	.440 <T	.490 <T	.550	.370 <T	.400 <T		
1991 MAR	.170 <T	.420 <T	.500 <T	.570	.370 <T	.380 <T		
1991 MAY	.510	.530	.510	.850	.600	.580		
1991 JUL	ISM	.470 <T	.530	.720	.480 <T	.510		
1991 SEP	.500 <T	.520	.470 <T	.620	.510	.470 <T		
1991 NOV	.250 <T	.690	.540	.700				
1992 JAN	.520	.470 <T	.530	.620				
1992 APR	.360 <T	.190 <T	.220 <T	.500 <T				
1992 JUL	.170 <T	.180 <T	.320 <T	.390 <T				
1992 OCT	.370 <T	.500 <T						
SELENIUM (UG/L)			DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)			
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL		
1991 MAR	BDL	BDL	1.200 <T	BDL	BDL	BDL		
1991 MAY	BDL	1.500 <T	BDL	BDL	BDL	BDL		
1991 JUL	ISM	BDL	BDL	BDL	BDL	BDL		
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL		
1991 NOV	BDL	1.300 <T	1.900 <T	BDL				
1992 JAN	BDL	1.200 <T	1.100 <T	BDL				
1992 APR	BDL	BDL	BDL	BDL				
1992 JUL	BDL	1.100 <T	BDL	BDL				
1992 OCT	3.100 <T	1.700 <T						
STRONTIUM (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = N/A			
1991 JAN	110.000	120.000	120.000	120.000	140.000	140.000		
1991 MAR	170.000	150.000	140.000	140.000	130.000	140.000		
1991 MAY	120.000	110.000	120.000	120.000	130.000	130.000		
1991 JUL	ISM	110.000	110.000	110.000	120.000	120.000		
1991 SEP	110.000	110.000	110.000	110.000	120.000	120.000		
1991 NOV	140.000	120.000	110.000	110.000				
1992 JAN	120.000	110.000	120.000	120.000				
1992 APR	110.000	110.000	120.000	120.000				
1992 JUL	120.000	120.000	130.000	130.000				
1992 OCT	110.000	110.000						

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE		TREATMENT PLANT TREATED	TREATMENT PLANT	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
METALS							
TITANIUM (UG/L)							
DET'N LIMIT = 0.50							
GUIDELINE = N/A							
1991 JAN	3,300 <T	3,200 <T	3,400 <T	3,500 <T	3,900 <T	3,900 <T	3,700 <T
1991 MAR	7,900	2,200 <T	1,900 <T	1,800 <T	2,300 <T	2,300 <T	2,400 <T
1991 MAY	4,200 <T	1,800 <T	3,000 <T	3,400 <T	4,100 <T	4,100 <T	3,800 <T
1991 JUL	ISM	1,100 <T	1,300 <T	1,400 <T	1,900 <T	1,900 <T	1,700 <T
1991 SEP	1,800 <T	BDL	.550 <T	BDL	BDL	BDL	BDL
1991 NOV	5,100	2,100 <T	2,100 <T	1,700 <T	1,700 <T	1,700 <T	1,700 <T
1992 JAN	2,300 <T	1,200 <T	1,200 <T	1,300 <T	1,300 <T	1,300 <T	1,300 <T
1992 APR	5,100	4,300 <T	4,600 <T	4,800 <T	4,800 <T	4,800 <T	4,800 <T
1992 JUL	5,800	4,500 <T	4,500 <T	4,600 <T	4,600 <T	4,600 <T	4,600 <T
1992 OCT	7,500	3,800 <T					
THALLIUM (UG/L)							
DET'N LIMIT = 0.05							
GUIDELINE = 13 (0.4%)							
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	ISM	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	.100 <T	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 APR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 OCT	BDL	BDL					
URANIUM (UG/L)							
DET'N LIMIT = 0.05							
GUIDELINE = 100 (A1)							
1991 JAN	.290 <T	.100 <T	.070 <T	.110 <T	.120 <T	.120 <T	.140 <T
1991 MAR	.580	.270 <T	.130 <T	.150 <T	.140 <T	.140 <T	.120 <T
1991 MAY	.350 <T	.080 <T	.070 <T	.100 <T	.080 <T	.080 <T	.070 <T
1991 JUL	ISM	BDL	.060 <T	BDL	BDL	BDL	BDL
1991 SEP	.290 <T	.060 <T	.060 <T	.060 <T	.060 <T	.060 <T	.060 <T
1991 NOV	.390 <T	.130 <T	BDL	.060 <T	.060 <T	.060 <T	.060 <T
1992 JAN	.300 <T	.070 <T	.070 <T	.080 <T	.080 <T	.080 <T	.080 <T
1992 APR	.260 <T	.070 <T	.070 <T	.070 <T	.070 <T	.070 <T	.070 <T
1992 JUL	.250 <T	.120 <T	.070 <T	.060 <T	.060 <T	.060 <T	.060 <T
1992 OCT	.350 <T	BDL					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
METALS					
VANADIUM (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = N/A	
1991 JAN	.120 <T	.500 <T	.420 <T	.500 <T	.520 <T
1991 MAR	2.300	.490 <T	.390 <T	.360 <T	.290 <T
1991 MAY	.400 <T	.590	.620	.630	.530
1991 JUL	ISM	.350 <T	.400 <T	.390 <T	.490 <T
1991 SEP	.690	.510	.490 <T	.520	.470 <T
1991 NOV	2.300	.350 <T	.200 <T	.340 <T	.570
1992 JAN	.270 <T	.330 <T	.280 <T	.340 <T	.
1992 APR	.120 <T	.180 <T	.250 <T	.220 <T	.
1992 JUL	.510	.610	.500 <T	.600	.
1992 OCT	.730	.270 <T	.	.	.
ZINC (UG/L)					
		DET'N LIMIT = 0.20		GUIDELINE = 5000 (A3)	
1991 JAN	5.200	1.800 <T	.960 <T	24.000	4.800
1991 MAR	17.000	2.600	2.900	16.000	3.300
1991 MAY	11.000	3.800	7.300	20.000	6.400
1991 JUL	ISM	1.500 <T	1.900 <T	23.000	1.500 <T
1991 SEP	5.900	1.000 <T	1.200 <T	18.000	.570 <T
1991 NOV	16.000	1.000 <T	2.600	18.000	.
1992 JAN	5.700	4.800	2.300	33.000	.
1992 APR	7.100	2.900	3.700	20.000	.
1992 JUL	6.500	2.000 <T	2.700	20.000	.
1992 OCT	7.600	1.700 <T	.	22.000	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHLOROPAROMATICS					
HEXACHLOROBUTADIENE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 450 (D4)	
20 SAMPLES	BDL	BDL			BDL
123-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = N/A	
18 SAMPLES	BDL	BDL			BDL
1234-TETChLOROBENZENE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = N/A	
20 SAMPLES	BDL	BDL			BDL
1235-TETChLOROBENZENE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = N/A	
18 SAMPLES	BDL	BDL			BDL
124-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = 10000 (1)	
18 SAMPLES	BDL	BDL			BDL
1245-TETChLOROBENZENE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 38000 (D4)	
20 SAMPLES	BDL	BDL			BDL
135-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = N/A	
20 SAMPLES	BDL	BDL			BDL
HEXACHLOROBENZENE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 10 (C1)	
20 SAMPLES	BDL	BDL			BDL
HEXACHLOROTHANE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 1900 (D4)	
1991 JAN	BDL	BDL	2,000 <T		BDL
1991 MAR	BDL	BDL	BDL		ITS
1991 MAY	BDL	BDL	BDL		ILA
1991 JUL	BDL	BDL	BDL		IAW
1991 SEP	BDL	BDL	BDL		IAW
1991 NOV	BDL	BDL	BDL		IAW
1992 JAN	BDL	BDL	BDL		BDL
1992 APR	BDL	BDL	BDL		BDL
1992 JUL	BDL	BDL	BDL		BDL
1992 OCT	BDL	BDL	BDL		BDL
OCTACHLOROSTYRENE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = N/A	
20 SAMPLES	BDL	BDL			BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHLOROAROMATICS					
PENTACHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 74000 (D4)	
18 SAMPLES	BDL	BDL		BDL	
236-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A	
18 SAMPLES	BDL	BDL		BDL	
245-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A	
20 SAMPLES	BDL	BDL		BDL	
26A-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A	
18 SAMPLES	BDL	BDL		BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
CHLOROPHENOLS					
234-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = N/A	
2 SAMPLES	BDL	BDL			
2345-TETCHLOROPHENOL (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
2 SAMPLES	BDL	BDL			
2356-TETCHLOROPHENOL (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
2 SAMPLES	BDL	BDL			
245-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 2600000 (D4)	
2 SAMPLES	BDL	BDL			
246-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 5000 (A1)	
2 SAMPLES	BDL	BDL			
PENTACHLOROPHENOL (NG/L)		DET'N LIMIT = 10.00		GUIDELINE = 60000 (A1)	
2 SAMPLES	BDL	BDL			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
PESTICIDES AND PCB					
ALDRIN (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 700 (A1)	
20 SAMPLES	BDL	BDL	BDL	BDL	BDL
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 700 (G)	
1991 JAN	BDL	BDL		BDL	
1991 MAR	BDL	BDL		ILS	
1991 MAY	IQU	ILA		ILA	
1991 JUL	IAW	IAW		IAW	
1991 SEP	IAW	IAW		IAW	
1991 NOV	1.000 <T	BDL			
1992 JAN	IQU	ILS			
1992 APR	1.000 <T	BDL			
1992 JUL	BDL	BDL			
1992 OCT	1.000 <T	BDL			
BETA BHC (NG/L)		DET'N LIMIT = 1.00		GUIDELINE = 300 (G)	
18 SAMPLES	BDL	BDL		BDL	
LINDANE (GAMMA BHC) (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)	
20 SAMPLES	BDL	BDL		BDL	
ALPHA CHLORDANE (NG/L)		DET'N LIMIT = 2.000		GUIDELINE = 7000 (A1)	
18 SAMPLES	BDL	BDL		BDL	
GAMMA CHLORDANE (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 7000 (A1)	
18 SAMPLES	BDL	BDL		BDL	
DIELDRIN (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 700 (A1)	
18 SAMPLES	BDL	BDL		BDL	
METHOXYCHLOR (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = 900000 (A1)	
18 SAMPLES	BDL	BDL		BDL	
ENDOSULFAN I (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 74000 (D4)	
20 SAMPLES	BDL	BDL		BDL	
ENDOSULFAN II (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 74000 (D4)	
18 SAMPLES	BDL	BDL		BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
PESTICIDES AND PCB					
ENDRIN (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 1600 (D3)	
20 SAMPLES	BDL	BDL			BDL
ENDOSULFAN SULPHATE (NG/L)					
		DET'N LIMIT = 5.00		GUIDELINE = N/A	
20 SAMPLES	BDL	BDL			BDL
HEPTACHLOR EPOXIDE (NG/L)					
		DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)	
14 SAMPLES	BDL	BDL			BDL
HEPTACHLOR (NG/L)					
		DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)	
18 SAMPLES	BDL	BDL			BDL
MIREX (NG/L)					
		DET'N LIMIT = 5.000		GUIDELINE = N/A	
18 SAMPLES	BDL	BDL			BDL
OXYCHLORDANE (NG/L)					
		DET'N LIMIT = 2.000		GUIDELINE = N/A	
18 SAMPLES	BDL	BDL			BDL
O,P-DDT (NG/L)					
		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)	
18 SAMPLES	BDL	BDL			BDL
PCB (NG/L)					
		DET'N LIMIT = 20.00		GUIDELINE = 3000 (A2)	
20 SAMPLES	BDL	BDL			BDL
P,P'-DDD (NG/L)					
		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)	
20 SAMPLES	BDL	BDL			BDL
P,P'-DDE (NG/L)					
		DET'N LIMIT = 1.000		GUIDELINE = 30000 (A1)	
20 SAMPLES	BDL	BDL			BDL
P,P'-DDT (NG/L)					
		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)	
20 SAMPLES	BDL	BDL			BDL
TOXAPHENE (NG/L)					
		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A1)	
16 SAMPLES	BDL	BDL			1LA

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
PESTICIDES AND PCB					
AMETRINE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 300000 (D3)	
16 SAMPLES	BDL				

ATRAZINE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 60000 (A2)	
1991 JAN	BDL				
1991 MAR	BDL				
1991 MAY	BDL				
1991 JUL	1AW				
1991 SEP	1AW				
1991 NOV	BDL				
1992 JAN	BDL				
1992 APR	60,000 <T				
1992 JUL	BDL				
1992 OCT	BDL				

ATRAZONE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A	
16 SAMPLES	BDL				

CYANAZINE (BLADEX) (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 10000 (A2)	
16 SAMPLES	BDL				

DESETHYL ATRAZINE (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = 60000 (A2)	
16 SAMPLES	BDL				

DESETHYL SIMAZINE (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = 10000 (A2)	
16 SAMPLES	BDL				

PROMETONE (NG/L)		DET'N LIMIT = 50,000		GUIDELINE = 52500 (D3)	
16 SAMPLES	BDL				

PROPAGINE (NG/L)		DET'N LIMIT = 50,000		GUIDELINE = 700000 (D3)	
16 SAMPLES	BDL				

PROMETRYNE (NG/L)		DET'N LIMIT = 50,000		GUIDELINE = 1000 (A2)	
16 SAMPLES	BDL				

METRIBUZIN (SENCOR) (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 80000 (A1)	
16 SAMPLES	BDL				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
PESTICIDES AND PCB					
SIMAZINE (NG/L)		DET'N LIMIT = 50.00		GUIDELINE = 10000 (A2)	
16 SAMPLES	BDL				
ALACHLOR (LASSO) (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A2)	
16 SAMPLES	BDL				
METOLACHLOR (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 50000 (A2)	
16 SAMPLES	BDL				
HEXACHLOROCYCLOPENTADIEN (NG/L)		DET'N LIMIT = 5.00		GUIDELINE = 206000 (D4)	
1991 JAN	BDL	BDL		BDL	
1991 MAR	BDL	BDL		ITS	
1991 MAY	IQU	ILA		ILA	
1991 JUL	IAW	IAW		IAW	
1991 SEP	IAW	IAW		IAW	
1991 NOV	BDL	10,000 <T			
1992 JAN	IQU	ITS			
1992 APR	IQU	IQU			
1992 JUL	IQU	IQU			
1992 OCT	IQU	IQU			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
PHENOLICS					
PHENOLICS (UC/L)		DET'N LIMIT =	0.2	GUIDELINE = N/A	
1991 JAN	.600 <T	.600 <T			
1991 MAR	1.400	BDL			
1991 MAY	1.000	.600 <T			
1991 JUL	BDL	.600 <T			
1991 SEP	1.400	1.000 <T			
1991 NOV	BDL	BDL			
1992 JAN	.400 <T	BDL			
1992 APR	.800 <T	BDL			
1992 JUL	.400 <T	BDL			
1992 OCT	BDL	BDL			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
POLYAROMATIC HYDROCARBONS					
PHENANTHRENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
ANTHRACENE (NG/L)		DET'N LIMIT = 1.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
FLUORANTHENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 42000 (D4)	
12 SAMPLES	BDL	BDL		BDL	
PYRENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
BENZO(A)ANTHRACENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
CHRYSENE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
DIMETH. BENZ(A)ANTHR (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
BENZO(E) PYRENE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
BENZO(B) FLUORANTHENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
PERYLENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
BENZO(K) FLUORANTHENE (NG/L)		DET'N LIMIT = 1.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
BENZO(A) PYRENE (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = 10 (A1)	
12 SAMPLES	BDL	BDL		BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
POLYAROMATIC HYDROCARBONS					
BENZO(G,H,I) PERYLENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
DIBENZO(A,H) ANTHRAC (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
INDENO(1,2,3-C,D) PY (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
BENZO(B) CHRYSENE (NG/L)		DET'N LIMIT = 2.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	
CORONENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
12 SAMPLES	BDL	BDL		BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER MSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
SPECIFIC PESTICIDES					
TOXAPHENE (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A1)	
4 SAMPLES	BDL	BDL		BDL	
2,4,5-T (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 280000 (A1)	
2 SAMPLES	BDL				
2,4-D (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 100000 (A1)	
2 SAMPLES	BDL				
2,4-DB (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
2,4-D PROPIONIC ACID (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
DICAMBA (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 120000 (A1)	
2 SAMPLES	BDL				
2,4,5-TP (SILVEX) (NG/L)		DET'N LIMIT = 20.00		GUIDELINE = 10000 (A1)	
2 SAMPLES	BDL				
DIAZINON (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 20000 (A1)	
2 SAMPLES	BDL				
DICHLOROVOS (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
CHLORPYRIFOS (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
ETHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 35000 (G)	
2 SAMPLES	BDL				
MALATHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 190000 (A1)	
2 SAMPLES	BDL				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARRON-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARRON FREE FLOW	DIST. SYSTEM RR#1 HARRON STANDING
SPECIFIC PESTICIDES					
MEVINPHOS (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
METHYL PARATHION (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 9000 (D3)	
2 SAMPLES	BDL				
METHYLTRITHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
PARATHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 50000 (A1)	
2 SAMPLES	BDL				
PHORATE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 2000 (A2)	
2 SAMPLES	BDL				
RELDAN (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
RONNEL (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
CARBOFURAN (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = 90000 (A1)	
2 SAMPLES	BDL				
CHLOROPHARM (CIPC) (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = 350000 (G)	
2 SAMPLES	BDL				
DIALLATE (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
EPTAM (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = N/A	
2 SAMPLES	BDL				
IPC (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = N/A	
2 SAMPLES	BDL				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT : RAW INTAKE		TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
SPECIFIC PESTICIDES						
PROPOXUR (NG/L)			DET'N LIMIT = 2000.0		GUIDELINE = 140000 (D3)	
2 SAMPLES		BDL				
CARBARYL (NG/L)			DET'N LIMIT = 200.0		GUIDELINE = 90000 (A1)	
2 SAMPLES		BDL				
BUTYLATE (NG/L)			DET'N LIMIT = 2000.0		GUIDELINE = 245000 (D3)	
2 SAMPLES		BDL				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
VOLATILES					
BENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)	
34 SAMPLES	BDL	BDL	BDL	BDL	BDL
TOLUENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)	
1991 JAN	BDL	.050 <T	.	.200 <T	.
1991 MAR	BDL	BDL	.	BDL	.
1991 MAY	BDL	.100 <T	.	BDL	.
1991 JUL	BDL	BDL	.	BDL	.
1991 SEP	BDL	BDL	.	BDL	.
1991 NOV	BDL	BDL	.	.	.
1992 JAN	BDL	BDL	.	.	.
1992 APR	BDL	BDL	.	.	.
1992 JUL	BDL	BDL	.	.	.
1992 OCT	BDL	.	.	.	.
ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)	
1991 JAN	.050 <T	.050 <T	.	.050 <T	.
1991 MAR	BDL	.050 <T	.	BDL	.
1991 MAY	BDL	.100 <T	.	.050 <T	.
1991 JUL	BDL	.150 <T	.	.200 <T	.
1991 SEP	.050 <T	.050 <T	.	BDL	.
1991 NOV	BDL	.100 <T	.	.	.
1992 JAN	.050 <T	BDL	.	.	.
1992 APR	.100 <T	.050 <T	.	.	.
1992 JUL	BDL	.250 <T	.	.	.
1992 OCT	BDL	.	.	.	.
P-XYLENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)	
34 SAMPLES	BDL	BDL	.	BDL	.
M-XYLENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)	
1991 JAN	BDL	BDL	.	.100 <T	.
1991 MAR	BDL	BDL	.	BDL	.
1991 MAY	BDL	BDL	.	BDL	.
1991 JUL	BDL	BDL	.	.100 <T	.
1991 SEP	BDL	BDL	.	BDL	.
1991 NOV	BDL	BDL	.	.	.
1992 JAN	BDL	BDL	.	.	.
1992 APR	BDL	BDL	.	.	.
1992 JUL	BDL	.100 <T	.	.	.
1992 OCT	BDL	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER JWS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
VOLATILES					
O-XYLENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 300 (A3*)	
1991 JAN	BDL	BDL		.050 <T	
1991 MAR	BDL	BDL		BDL	
1991 MAY	BDL	.050 <T		BDL	
1991 JUL	BDL	.150 <T		.050 <T	
1991 SEP	BDL	.100 <T		BDL	
1991 NOV	BDL	BDL			
1992 JAN	BDL	BDL			
1992 APR	BDL	BDL			
1992 JUL	BDL	.050 <T			
1992 OCT	BDL				
STYRENE (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 100 (D1)	
1991 JAN	.100 <T	BDL		.050 <T	
1991 MAR	BDL	BDL		BDL	
1991 MAY	BDL	.100 <T		.100 <T	
1991 JUL	BDL	.200 <T		.350 <T	
1991 SEP	.100 <T	BDL		.050 <T	
1991 NOV	.100 <T	BDL			
1992 JAN	.200 <T	BDL			
1992 APR	.100 <T	BDL			
1992 JUL	BDL	.100 <T			
1992 OCT	BDL	.450 <T			
1,1-DICHLOROETHYLENE (UG/L)					
		DET'N LIMIT = 0.100		GUIDELINE = 7 (D1)	
34 SAMPLES	BDL	BDL		BDL	
METHYLENE CHLORIDE (UG/L)					
		DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)	
34 SAMPLES	BDL	BDL		BDL	
T12-DICHLOROETHYLENE (UG/L)					
		DET'N LIMIT = 0.10		GUIDELINE = 70 (D1)	
34 SAMPLES	BDL	BDL		BDL	
1,1-DICHLOROETHANE (UG/L)					
		DET'N LIMIT = 0.100		GUIDELINE = N/A	
34 SAMPLES	BDL	BDL		BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
VOLATILES					
CHLOROFORM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)	
1991 JAN	BDL	5.400			
1991 MAR	BDL	11.900		2.900	5.300
1991 MAY	BDL	12.100		5.400	6.500
1991 JUL	BDL	14.400		8.500	6.700
1991 SEP	BDL	9.000		9.100	6.300
1991 NOV	BDL	4.500		2.900	8.600
1992 JAN	BDL	3.500		1.900	
1992 APR	BDL	7.300		4.400	
1992 JUL	BDL	14.800		7.800	
1992 OCT	BDL	10.000			
1,1,1-TRICHLOROETHANE (UG/L)					
		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)	
34 SAMPLES	BDL	BDL			BDL
1,2-DICHLOROETHANE (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)	
34 SAMPLES	BDL	BDL			BDL
CARBON TETRACHLORIDE (UG/L)					
		DET'N LIMIT = 0.20		GUIDELINE = 5 (A1)	
34 SAMPLES	BDL	BDL			BDL
1,2-DICHLOROPROPANE (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)	
34 SAMPLES	BDL	BDL			BDL
TRICHLOROETHYLENE (UG/L)					
		DET'N LIMIT = 0.10		GUIDELINE = 50 (A1)	
34 SAMPLES	BDL	BDL			BDL
DICHLOROBROMOMETHANE (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)	
1991 JAN	BDL	6.300			
1991 MAR	BDL	9.350		3.300	5.250
1991 MAY	BDL	9.350		4.900	5.300
1991 JUL	BDL	8.400		6.800	6.300
1991 SEP	BDL	6.600		5.600	5.250
1991 NOV	BDL	5.850		6.200	6.400
1992 JAN	BDL	6.300		3.600	
1992 APR	BDL	7.500		3.400	
1992 JUL	BDL	7.400		4.500	
1992 OCT	BDL	9.300		6.000	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	TREATMENT PLANT WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
VOLATILES					
112-TRICHLOROETHANE (UG/L)					
34 SAMPLES	BDL	BDL	BDL	BDL	BDL
GUIDELINE = 0.6 (04)					
CHLORODIBROMOMETHANE (UG/L)					
1991 JAN	BDL	4,200	2,800	3,700	3,700
1991 MAR	BDL	5,200	3,400	3,700	3,700
1991 MAY	BDL	8,200	6,200	5,300	5,300
1991 JUL	BDL	4,700	3,400	3,600	3,600
1991 SEP	BDL	4,600	4,400	4,500	4,500
1991 NOV	BDL	4,400	3,400		
1992 JAN	BDL	4,900	3,300		
1992 APR	BDL	5,400	4,100		
1992 JUL	BDL	4,500	5,000		
1992 OCT	BDL	5,600			
GUIDELINE = 350 (A1+)					
TETRACHLOROETHYLENE (UG/L)					
34 SAMPLES	BDL	BDL	BDL	BDL	BDL
GUIDELINE = 65 (A5)					
BROMOFORM (UG/L)					
1991 JAN	BDL	.600 <T	.400 <T	.400 <T	.400 <T
1991 MAR	BDL	.600 <T	.400 <T	.400 <T	.400 <T
1991 MAY	BDL	1,200 <T	1,000 <T	1,000 <T	1,000 <T
1991 JUL	BDL	.600 <T	.400 <T	.600 <T	.600 <T
1991 SEP	BDL	.800 <T	.800 <T	.600 <T	.600 <T
1991 NOV	BDL	.600 <T	BDL		
1991 DEC	BDL	BDL	BDL		
1992 JAN	BDL	.800 <T	BDL		
1992 APR	BDL	BDL	BDL		
1992 JUL	BDL	BDL	BDL		
1992 OCT	BDL	BDL			
GUIDELINE = 0.17 (04)					
1122-TRICHLOROETHANE (UG/L)					
34 SAMPLES	BDL	BDL	BDL	BDL	BDL
GUIDELINE = 2 (01)					
VINYL CHLORIDE (UG/L)					
8 SAMPLES	BDL	BDL	BDL		
GUIDELINE = 70 (01)					
C12-DICHLOROETHYLENE (UG/L)					
8 SAMPLES	BDL	BDL	BDL		
GUIDELINE = 70 (01)					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
VOLATILES					
CHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 1510 (D3)	
34 SAMPLES	BDL	BDL		BDL	
1,4-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 5 (A1)	
34 SAMPLES	BDL	BDL		BDL	
1,3-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 3750 (D3)	
34 SAMPLES	BDL	BDL		BDL	
1,2-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 200 (A1)	
34 SAMPLES	BDL	BDL		BDL	
ETHYLENE DIBROMIDE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (D1)	
34 SAMPLES	BDL	BDL		BDL	
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)	
1991 JAN	16.350	9.400		14.800	
1991 MAR	27.050	14.100		15.700	
1991 MAY	31.000	22.500		19.250	
1991 JUL	28.100	17.900		15.750	
1991 SEP	21.000	20.500		20.100	
1991 NOV	15.350	9.900			
1992 JAN	14.700	8.600			
1992 APR	20.900	13.000			
1992 JUL	26.700	18.800			
1992 OCT	24.900				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 HARROW-COLCHESTER WSS

TREATMENT PLANT RAW INTAKE	TREATMENT PLANT TREATED	DIST. SYSTEM WALNUT ST. FREE FLOW	DIST. SYSTEM WALNUT ST. STANDING	DIST. SYSTEM RR#1 HARROW FREE FLOW	DIST. SYSTEM RR#1 HARROW STANDING
RADIONUCLIDES					
COBALT 60 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A	
4 SAMPLES	BDL				
CESIUM 134 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A	
4 SAMPLES	BDL				
CESIUM 137 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 50 (A1)	
4 SAMPLES	BDL				
GROSS ALPHA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = 0.55 (D1)	
1991 MAR	.110				
1992 JAN	BDL				
GROSS BETA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = N/A	
1991 MAR	.290				
1992 JAN	.080				
TRITIUM (BQ/L)		DET'N LIMIT = 7.00		GUIDELINE = 40000 (A1)	
1991 MAR	11,000				
1992 JAN	9,000				
IODINE 131 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 10 (A1)	
4 SAMPLES	BDL				

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
-----	----	-----	-----
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.20	30-500 (A4)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.20	100.0 (F2)
CHLORIDE	MG/L	0.20	250.0 (A3)
COLOUR	TCU	0.50	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0 (A3)
FLUORIDE	MG/L	0.01	1.5* (A1)
HARDNESS	MG/L	0.50	80-100 (A4)
IONCAL	DMNSLESS	N/A	N/A
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.10	30.0 (F2)
NITRATES (TOTAL)	MG/L	0.005	10.0 (A1)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
POTASSIUM	MG/L	0.010	10.0 (F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0 (A3)
SODIUM	MG/L	0.20	200.0 (A4)
SULPHATE	MG/L	0.20	500.0 (A4)
TURBIDITY	FTU	0.05	1.0 (A1)
* The Maximum Acceptable Concentration (MAC) for <u>naturally occurring fluoride</u> in drinking water is 2.4 mg/L.			
CHLOROAROMATICS			
1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	N/A
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
POLYNUCLEAR AROMATIC HYDROCARBONS			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRAZONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DESETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADAX)	NG/L	100.0	10000 (A2)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	30000 (A1)
O,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDE	NG/L	1.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPACINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
DESETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.0	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.0	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A
2,4,5-TP (SILVEX)	NG/L	20.0	10000 (A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.0	90000 (A1)
CARBOFURAN	NG/L	2000.0	90000 (A1)
CHLOROPROPHAM (CIPC)	NG/L	2000.0	350000 (G)
CHLORPYRIFOS (DURSABAN)	NG/L	20.0	N/A
DIALATE	NG/L	2000.0	N/A
DIAZINON	NG/L	20.0	20000 (A1)
DICAMBA	NG/L	50.0	120000 (A1)
DICHLOROVOS	NG/L	20.0	N/A
EPTAM	NG/L	2000.0	N/A
ETHION	NG/L	20.0	35000 (G)
IPC	NG/L	2000.0	N/A
MALATHION	NG/L	20.0	190000 (A1)
METHYL PARATHION	NG/L	50.0	9000 (D3)
METHYLTRITHION	NG/L	20.0	N/A
MEVINPHOS	NG/L	20.0	N/A
PARATHION	NG/L	20.0	50000 (A1)
PHORATE (THIMET)	NG/L	20.0	2000 (A2)
PICHLORAM	NG/L	100.0	190000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000 (D3)
RELDAN	NG/L	20.0	N/A
RONNEL	NG/L	20.0	N/A
VOLATILES			
1,1-DICHLOROETHANE	UG/L	0.10	N/A
1,1-DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2-DICHLOROETHANE	UG/L	0.05	5 (A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5 (A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200 (D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORO Dibromomethane	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	65 (A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)
VINYL CHLORIDE	UG/L	0.10	2 (D1)
RADIONUCLIDES			
TRITIUM	BQ/L	7.0	40000 (A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55# (D1)
GROSS BETA COUNT	BQ/L	0.04	N/A
COBALT 60	BQ/L	0.70	N/A
CESIUM 134	BQ/L	0.70	N/A
CESIUM 137	BQ/L	0.70	50 (A1)
IODINE 131	BQ/L	0.70	10 (A1)

Equal to 15.0 Picocuries/litre

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 $\mu g/L$

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41)
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27)
BOILING POINT: 80.1°C (27)
SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41)
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39)
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	<ul style="list-style-type: none"> -220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	<ul style="list-style-type: none"> -45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP), (PEOP), (PECAR)	<ul style="list-style-type: none"> -as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	<ul style="list-style-type: none"> -250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL), (PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.

6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

